

# Quality Assurance and Quality Control (QA/QC) Requirements for Mercury Data

## QA/QC General Requirements:

United States Environmental Protection Agency (USEPA) Test Method 1631, the test method used to acquire low-level mercury data necessary for assessing water quality with respect to the Great Lakes Initiative (GLI) mercury Water Quality Standard (WQS), is an extremely sensitive but complex test method. As a result of this sensitivity and complexity, USEPA Test Method 1631 requires a rigorous battery of QA/QC checks to be in control in order to validate mercury data. The following tables (Table A and Table B) identify and define the types of QA/QC checks required for laboratory analysis, especially for USEPA Test Method 1631 used for low-level mercury analysis:

**Table A. Instrument Calibration and Standardization QA/QC Checks**

Instrument Calibration and Standardization QA/QC Check	Purpose
ICB - Initial Calibration Blank	This quality control sample is analyzed immediately following instrument calibration and is used to monitor instrument baseline drift as well as contamination introduced by the laboratory environment.
CCB - Continuing Calibration Blank	This quality control sample is analyzed at prescribed intervals throughout the entire analytical run and is used to monitor instrument baseline drift as well as contamination introduced by the laboratory environment.
ICV - Initial Calibration Verification	This quality control sample is analyzed immediately following instrument calibration and is used to verify the accuracy of the instrument calibration and to monitor instrument drift and overall instrument performance.
CCV - Continuing Calibration Verification	This quality control sample is analyzed at prescribed intervals throughout the entire analytical run and is used to verify the continued accuracy of the instrument calibration and to monitor instrument drift and overall instrument performance.
IPR - Initial Precision and Recovery	After any necessary sample preparation procedures (digestion, extraction, etc.), these 4 quality control samples are analyzed immediately following instrument calibration and are used to verify the instrument and any necessary sample preparation procedures are capable of meeting the performance standards required by the various performance based EPA test methods.
OPR - Ongoing Precision and Recovery	After any necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals and is used to verify the instrument and any necessary sample preparation procedures are continually capable of meeting the performance standards required by the various performance based EPA test methods.

**Table B. Sample Specific QA/QC Checks**

Sample Specific QA/QC Check	Purpose
QCS – Quality Control Sample	After any necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals and is used to verify the instrument and any necessary sample preparation procedures are capable of continually meeting the performance standards required by the various performance based EPA test methods.
LCS - Laboratory Control Sample	After the necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals and is used to verify the accuracy of the instrument and the sample preparation procedures.
LFB - Laboratory Fortified Blank	After the necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals and is used to verify the accuracy of the instrument and the sample preparation procedures.
MS / MSD - Matrix Spike / Matrix Spike Duplicate	After the necessary sample preparation procedures (digestion, extraction, etc.), these quality control samples are analyzed at prescribed intervals in order to verify the accuracy and precision of the instrument and the necessary sample preparation procedures with regard to a specific sample matrix.
DUP - Method Duplicate	After the necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals in order to verify the precision of the instrument and the necessary sample preparation procedures with regard to a specific sample matrix.
Method Blank	After the necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals and is used to monitor instrument baseline drift as well as contamination introduced by the sample preparation procedures and the laboratory environment.

Field Blank	After any necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals and is used to monitor instrument baseline drift as well as contamination introduced by the sampling equipment, sample bottles, sample preservatives, field sampling techniques, the sample site conditions, any sample preparation procedures, and the laboratory environment.
Field Duplicate	After the necessary sample preparation procedures (digestion, extraction, etc.), this quality control sample is analyzed at prescribed intervals in order to verify the precision of the instrument, the overall field sampling technique, and the necessary sample preparation procedures with regard to a specific sample matrix and sampling site.

In addition to the above information, the data package must include the following:

- Initial demonstration of Method Detection Limit (MDL) or Limit of Detection (LOD) of at least 0.2 nanograms/Liter (ng/L) for Mercury; an MDL (or LOD) as low as 0.05 ng/L can be achieved for low mercury samples by using a larger sample volume, a lower Bromine Monochloride (BrCl) of 0.2%, and extra caution in sample handling
- The Minimum Level (ML) or Limit of Quantitation (LOQ) must be 3.18 times the MDL (or LOD) and preferably 5 to 10 times lower than the GLI mercury WQS of 1.3 ng/L
- A Chain of Custody Record with sample collection dates and times
- Name, location or address, telephone number, and point of contact for the contract laboratory or any subcontract laboratory
- Sample analysis date and times
- A case narrative describing deviations from USEPA Test Method 1631, QA/QC check failures or abnormalities, and information about re-analyses if applicable must also be submitted.